

Remarks

Upon entry of the foregoing amendment, claims 1-36 are pending, with claims 1, 6, 11, 16, 21, 26 and 31 being independent. No new matter has been added.

The Examiner is invited to telephone the undersigned representative if he believes that an interview might be useful for any reason.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.



Donald J. Featherstone
Attorney for Applicants
Registration No. 33,876

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1100 New York Avenue, N.W.
Suite 600
Washington, D.C. 20005-3934
(202) 371-2600

Version with markings to show changes made

[0001] This application is a continuation-in-part of U.S. Nonprovisional Application No. 09/537,692, filed March 29, 2000, (which is incorporated herein by reference), and claims [priority to] the benefit of U.S. Provisional [Patent] Application No. 60/209,857, [entitled "Apparatus, System and Method for One-Of-Many Positions Modulation in an Impulse Radio Communications System,"] filed June 7, 2000.

[0095] Impulse systems can measure distances to extremely fine resolution because of the absence of ambiguous cycles in the waveform. Narrow band systems, on the other hand, are limited to the modulation envelope and cannot easily distinguish precisely which RF cycle is associated with each data bit because the cycle-to-cycle amplitude differences are so small they are masked by link or system noise. Since the impulse radio waveform has no multi-cycle ambiguity, this allows positive determination of the waveform position to less than a wavelength - potentially, down to the noise floor of the system. This time position measurement can be used to measure propagation delay to determine link distance, and once link distance is known, to transfer a time reference to an equivalently high degree of precision. The inventors of the present invention have built systems that have shown the potential for centimeter distance resolution, which is equivalent to about 30 ps of time transfer resolution. See, for example, commonly owned, co-pending applications 09/045,929, filed March 23, 1998, titled "Ultrawide-Band Position Determination System and Method", and 09/083,993, filed May 26, 1998, titled "System and Method for Distance Measurement by In phase and [Citriodora] Quadrature Signals in a Radio System", both of which are incorporated herein by reference.

[0209] In another embodiment of the present invention, in addition to placing each impulse in one-of-N positions within each frame, each impulse can also be flipped (i.e., inverted), thereby doubling the number of data states. Thus, in a one-of-four

positions with shift modulation scheme, a non-inverted impulse can be located in one of four possible positions or an inverted impulse can be located in one of the four possible [postions] positions, providing for eight data states. Flip modulation was described in U.S. Patent Application No. [09/537,629] 09/537,692, filed March 29, 2000, entitled "Apparatus, System and Method for Flip Modulation in an Impulse Radio Communications System," which is incorporated herein by reference in its entirety.